

## The Station Manipulator Arm Augmented Reality Trainer, Phase I

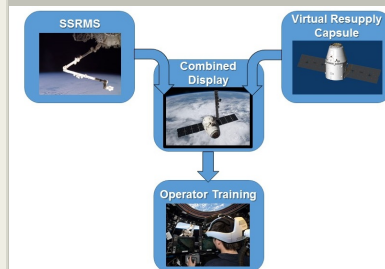
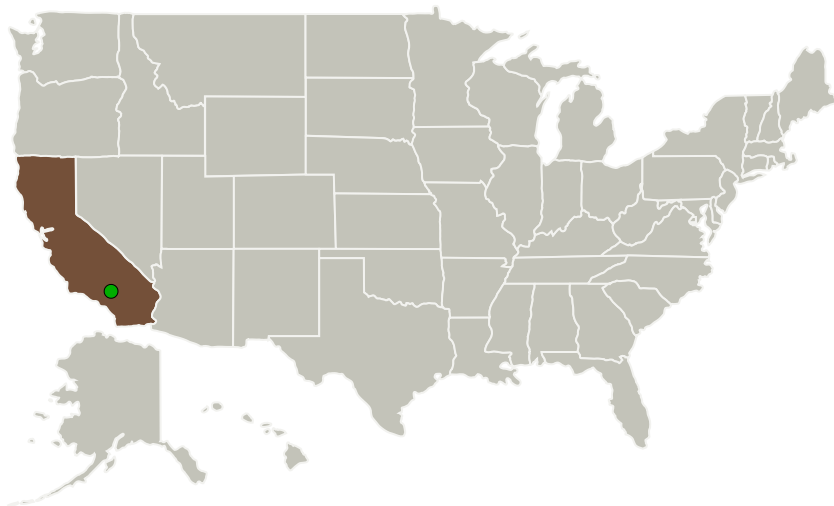
Completed Technology Project (2016 - 2016)



## Project Introduction

One of the most demanding and high-stakes crew tasks aboard the International Space Station (ISS) is the capture of a visiting spacecraft by manual operation of the Space Station Robotic Manipulator System (SSRMS, or Canadarm2). The cost of a missed capture or improper arm/vehicle contact is likely to be very high. Since these operations may be performed up to six months after the most recent ground-based training, crews aboard the ISS prepare for such manual robotic tasks with the Robotics On-Board Trainer, a laptop-based graphical/dynamic simulator using NASA Dynamic Onboard Ubiquitous Graphic (DOUG) software from Johnson Space Center's Virtual Reality Laboratory. This system, however, does not utilize any real-world, 3-D, out-the-window views. Building upon recent advances in head-mounted augmented reality systems, the team of Systems Technology, Inc. and Dr. Stephen Robinson of UC Davis propose the Station Manipulator Arm Augmented Reality Trainer (SMAART) that will offer ISS crews significantly more realistic on-board refresher training for vehicle capture by manipulating the actual SSRMS with real out-the-Cupola-window views, but with a graphically-simulated vehicle overlaid on the astronaut's non-simulated view via a head-mounted display. Providing multi-sensory realism in on-board training for such high cognitive-demand skills is expected to increase crew readiness and therefore reduce operational risk for visiting vehicle capture.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Systems Technology, Inc	Lead Organization	Industry	
● Armstrong Flight Research Center (AFRC)	Supporting Organization	NASA Center	Edwards, California

## Primary U.S. Work Locations

California

## Project Transitions

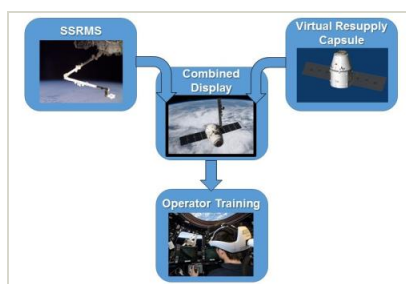
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

## Closeout Documentation:

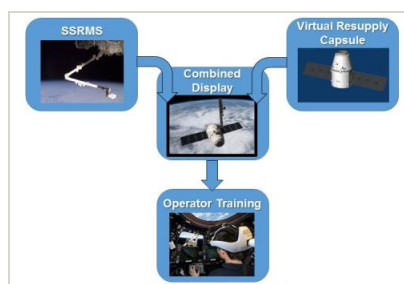
- Final Summary Chart (<https://techport.nasa.gov/file/139564>)

## Images



## Briefing Chart Image

The Station Manipulator Arm Augmented Reality Trainer, Phase I (<https://techport.nasa.gov/image/128534>)



## Final Summary Chart Image

The Station Manipulator Arm Augmented Reality Trainer, Phase I Project Image (<https://techport.nasa.gov/image/134648>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Systems Technology, Inc

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

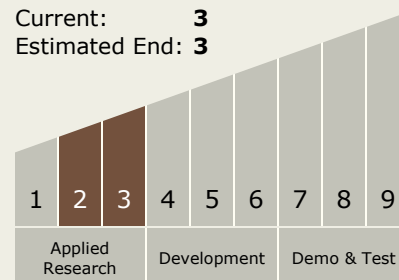
Carlos Torrez

## Principal Investigator:

David H Klyde

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



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## Technology Areas

### Primary:

- TX07 Exploration Destination Systems
  - └ TX07.3 Mission Operations and Safety
    - └ TX07.3.3 Training

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System